The Biorhythm Problem **Name** _____

Introduction: Biorhythm theory states that a person's biological functioning is controlled by three phenomena that vary sinusoidally with time. It uses the graphs of three simple sine funtions to make predictions about an individual's physical, emotional, and intellectual potential for a particular day. The graphs are given by $y = A\sin(Bx)$, where x=0 corresponds to a person's day of birth, and where A=1 is used to denote 100% potential. The theory states that when the physical cycle is near a high point, the person can do well in physical activities, and so forth.

1. The physical cycle has a period of 23 days, after which it repeats itself. Applying this to our graph of the sinusoidal function, the Period = $\frac{2\pi}{B} = 23$. Solving for B we find that $B = \frac{2\pi}{23}$. Therefore, the physical biorhythm can be described with the function $y = \sin\left(\frac{2\pi}{23}x\right)$. Enter this function in Y1 of your calculator. (Do not graph it yet!)

2. Since, according to biorhythm theory, the emotional cycle has a period of 28 days, the emotional biorhythm can be modeled by the function:

$y =$ _____

Enter this in Y2.

3. Finally, the intellectual cycle has a period of 33 days. Therefore, the intellectual biorhythm can be modeled by the function:

$y =$ _____

Enter this in Y3.

Application:

4. In September, 1992, Hall of Fame baseball player George Brett was trying to get his 3000th major league hit. George was born on May 15, 1953. Graph his three biorhythms for the month of September, 1992. To do this, you will need to define an appropriate range of x-values. The minimum x-value is equal to the number of days that George was alive from his day of birth to the first day of September, 1992. For your information, 1956, 1960, 1964,..., and 1992 were leap years. (Leap years are years that are divisible by 4.) To get the maximum x-value, add the number of days of the month you are interested in to the minimum x-value.

Xmin = _____ $(39 \cdot 365 + 108 + 10)$

Explain what each of these numbers represents!

39: _____

365: _____

108: _____

10: _____

Xmax = _____ (Xmin + 30)

After you have set your window, graph the three functions to show George Brett's biorhythms for the month of September, 1992. Sketch (and label) the graphs below. (You may want to sketch each graph with a different color.)

5. What day(s) of the month was George at his emotional high? _____

6. What day(s) of the month was George at an intellectual high? _____

7. On September 30, 1992, after missing two games because of a shoulder injury, George Brett got four consecutive hits against the Anaheim Angels and reached the historic 3000 hit mark. What was George's physical level on that day? _____

8. Now it is time to determine and graph your biorhythms for the month of _____, _____. The functions will not change, only the range of x-values. You must calculate the number of days from your birth to the first day of the month you are interested in. This will be Xmin. To determine Xmax, add the number of days in the month to the value of Xmin.

Record the month, day, and year, of your birthday. _____

Xmin = _____ • 365 + _____ + _____ = _____

Xmax = _____

Enter these values in your calculator, and graph the functions. Sketch the biorhythm functions below, labelling which one represents emotional, intellectual, and physical.

9. What is your best physical day(s) of the month? _____ Emotional day(s)? _____

10. On what day(s) do you want me to schedule our next test, so that you can do your best? _____

With your luck, when will I probably schedule the next test? _____

11. What will be your best "overall day" of the month? Explain. _____

_____

12. When all three cycles are at, or near, a low, biorhythm theory claims that a person's overall performance is very poor. When during the next month will your overall performance be the lowest? _____

13. Biorhythm theory says that the most "dangerous" time (accidents, illness, bad decisions), occurs on a day when a particular function crosses the "time axis". During the month graphed, what is the date when this first happened for your physical function? _____ Emotional function? _____ Intellectual function? _____

14. Pick a date this month that is important to you. _____ What is happening on this day? _____ Which biorhythm function do you want to be high? _____ Is it? _____

***** 15. On the day you were born, all three cycles are at zero. In how many days will all three cycles be at zero again? _____ Approximately how often would you expect this to happen during a lifetime of, for example, 80 years? _____